

# PATENT SPECIFICATION

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DRAWINGS ATTACHED.

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## COMPLETE SPECIFICATION.

### Apparatus for Opening Up and Drying Damp Textile Materials.

I, ARNFRIED MEYER, a Citizen of Germany, of Neckargartacherstrasse, Frankenbach, near Heilbronn, Germany, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to apparatus for opening up damp textile materials and for drying them by means of hot air, comprising a rotating perforated drum provided at its ends with a charging and a delivering opening respectively and with means for closing the delivering opening, the drum being tiltable from an axially horizontal into a tilted position and being enclosed within a stationary casing having openings at its ends and means for closing the casing openings respectively.

In conventional apparatus for the specified purposes the ends of the perforated drum are permanently open and the drum is tilted out of the horizontal. The material which is to be dried continuously travels axially through the drum in a direction contrary to that of the circulating hot air. This form of construction has the drawback that the continuous travel of the material through the drum and the permanently open ends of the drum prevent the material from being fully and efficiently dried.

There is also known a washing machine having a rotating perforated drum and a non-rotary outer casing, each having openings at its ends and means for closing the openings, the outer casing and with it the drum being adapted to be tilted bodily in a longitudinal direction, so that the textile materials in the drum may fall to the discharging end, where they may fall out of the machine. Such a machine has the drawback

that the casing is tilted together with the drum so that all service connections for water, steam, washing liquors, electric power and waste outlet, must be either flexible, or capable of being disconnected during the tilting period, or must connect with the machine through suitable joints in the trunnions on which the machine tilts.

The object of the invention is the provision of apparatus for opening up damp textile materials and for drying them by means of hot air, so that the material either may (i) continuously travel axially through the drum and thereby be only opened up and dried to a limited degree or may (ii) be dried fully by interrupting the axial travel for a given time.

This object is achieved in that rollers, provided at the filling end of the drum for supporting the drum, are mounted on slides adapted to be vertically raised and lowered, a flap for closing the filling end of the casing and a disc for closing the delivery end of the drum being arranged to be operated in synchronism with the slides, in such manner that flap and disc will be in open position when the drum is in tilted position.

The following operations can then be performed:—

1. If it is merely desired to loosen up the material without drying it, the ends of the drum are left open and the drum is tilted into a position in which the material will travel through the drum at a rate which conforms with the desired period of treatment.
2. If, apart from a loosening effect, preliminary drying is also desired, hot air is sucked through the drum which has been placed in its tilted position causing the treated material to travel from

the top to the bottom end of the drum.

3. If in addition to loosening up the textile material, it is desired completely to dry the material, the drum is retained in tilted position for only as long as it takes the material to travel from one end of the drum to the other, so that at the end of this period the drum will be evenly loaded with textile material. When the drum is thus loaded it is restored to horizontal position in which it ceases to have a forwarding effect on the material. In this position the filling and delivery openings are closed and the material is dried whilst the drum is rotated. At the end of the drying treatment, the drum is again moved into tilted position, and at the same time the filling and delivery ends are reopened, permitting the contents of the drum to be discharged.

In order to permit the drum to be tilted into a sloping position vertically slidably displaceable friction rollers supporting the drum are provided in the neighbourhood of the filling end of the drum, whereas at the other, delivery, end of the drum friction rollers are likewise provided for supporting the drum as well as for transmitting rotation thereto from a motor.

Conveniently the arrangement may comprise several, and preferably two, driven shafts which extend parallel with the drum axis and each of which carries two of the rollers for supporting the drum, one in the vicinity of the filling end and one near the delivery end of the drum, the ends of said shafts being journaled in hemispherical bearings of which the bearings located at the filling end of the drum are arranged to be vertically raised and lowered. These vertically displaceable hemispherical bearings may each be mounted on the upper end of a slide of which the lower end rests upon an adjustable compression spring which bears on the frame of the apparatus. Conveniently, each slide may be guided by two parallel levers of which one is deflectable by a pneumatically or hydraulically operable actuator of the cylinder and piston type.

A flap for closing the filling end of the casing and a disc for closing the delivery end of the drum are operable in synchronism with said slides, so that the flap and the disc are both open when the drum is in tilted position. This result may be achieved by coupling the flap which is manually operable with a valve, actuated by the action of opening and closing the flap, for controlling the cylinder and plunger which raises and lowers the slides as well as another cylinder and plunger for operating the disc which closes the delivery end of the drum. This disc is rotatably mounted on one end of a piston rod

which passes through the associated cylinder-and-plunger-type actuator coaxially with the horizontal axis of the drum. The said disc, which is perforated, is axially displaceably located in a chamber surrounding the delivery end of the drum but separated from the space enclosed by the drum and its casing. Hot air can be drawn into this chamber which, adjacent the opening at the delivery end of the drum and below the same has a chute for discharging the material as it emerges from the end of the drum. The chute can be opened and closed simultaneously with the delivery end of the drum by a flap door operated by a link rod which is articulated with the piston rod of the cylinder-and-piston-type actuator associated with the disc.

A fan is arranged to draw in air through the chamber surrounding the delivery opening and then through the perforated disc into the drum, part of this air being discharged by the fan to the outside and part being reheated and returned by the fan into the drum.

The invention will now be described in more detail by way of example, with reference to the accompanying drawings, in which:—

Fig. 1 is an elevation, partly in axial section, of apparatus according to the invention;

Fig. 2 is a view of the delivery end of the drum, the heating element being removed;

Fig. 3 shows the position of the drum tilting means when the drum axis is in tilted position; and

Fig. 4 shows the means for driving the drum.

Mounted in a casing 1 is a perforated drum 2 with girth rings 3 supported on rollers 4. Two pairs of rollers 4 are provided, each pair on a shaft 5, both shafts 5 being parallel to the axis of the drum 2. One roller of each pair, which roller is arranged at the end of drum 2, is fast on its shaft 5. Each shaft 5 is journaled in hemispherical bearings 7. The shafts 5 are driven by a motor 38 through belts 39, 40 and a layshaft 41. The belts 40 are kept taut in conventional manner by a tensioning roller 42. The drum is secured against axial displacement, especially when in tilted position, by a roller 43 mounted adjacent a flanged ring 3 near the delivery end 8 of the drum.

The hemispherical bearings 6 nearest the delivery end 8 of the drum are secured to casing 1 of the apparatus, whereas the hemispherical bearings 7 nearest the filling end 9 of the drum are vertically movable. They are mounted on the upper end of a slide 10 which can be raised or lowered by parallel levers 11, 11<sup>1</sup> pivotably mounted on the casing at 12. Lever 11<sup>1</sup> is a two-armed lever and the end of one arm is hingeably connected with the piston rod 13 of an

actuator of the cylinder and piston type 14.

When cylinder and piston 14 are not under pressure, the slide 10 rests on a compression spring 15 which can be adjustably biased.

- 5 One end of this spring 15 bears on the casing 1, whereas the other end presses against a plate 16 which is provided with an opening for the passage therethrough of the slide 10, and which is slidably mounted on two spindles 10 17, 18 extending parallel with the axis of said spring 15. One spindle 18 is rotatably held in two lugs 19 attached to the casing 1 of the drum, one lug being threaded for co-operation with a corresponding thread 20 on part of the length of said spindle 18. Above plate 15 16 spindle 18 has a collar 21 and carries a deflectable handle 22. Hence, by axially displacing spindle 18 by rotating it in the threaded lug 19, plate 16 can be raised and 20 lowered for setting the biasing pressure of spring 15. This is adjusted to support the slide 10 on spring 15 in a position in which the drum 2 will be horizontal when the cylinder-and-piston type actuator 14 is not 25 pressurised.

- The filling end 9 of the drum is equipped with a hopper 23 which can be closed by a flap 25 hingeably mounted at 24. Hinge 24 30 is coupled with a valve 26 which is so connected to the actuator 14 that closing of flap 25 will inactivate the cylinder-and-piston actuator 14, whereas opening of the flap 25 will pressurise the same, causing slide 10 to rise and the drum to be elevated into a tilted 35 position.

- Delivery opening 8 can be closed by a perforated disc 27 which is rotatably supported coaxially with drum 2 and also displaceable in the direction of the drum axis. 40 To this end disc 27 is rotatably mounted on the extended piston rod 28 of another cylinder-and-piston type actuator 29 which is likewise controlled by valve 26 to open the delivery end 8 of drum 2 when filling flap 25 45 is moved into open position and to close the delivery opening by means of disc 27 when the filling flap 25 is closed. The arrangement is such that the filling end of the casing and the delivering end of drum 2 will be closed 50 by the filling flap 25 and the disc 27 respectively when the drum is in horizontal position, whereas flap 25 and disc 27 will be open when the drum is in tilted position.

- The delivery end 8 of drum 2 is surrounded 55 by a chamber 30 with an opening 31 covered by heating means 32. Air entering through opening 31 is heated by said heating means 32 and enters chamber 30 through adjustable louver shutters 33. The chamber is fitted 60 with a chute 34 below the lip of the delivery opening 8 of the drum to permit the material emerging from the drum 2 to fall through the chute on to a conveyor belt 35. Chute 34 can be closed by a flap 36 hinged to casing 1 65 and operable by a link rod 37 coupled with

piston rod 28 of the cylinder-and-piston actuator 29 in such manner that flap 36 will open when disc 27 is retracted and conversely.

The space enclosed by the casing surrounding drum 2 has an opening at the bottom with a screen 44 through which a fan 45 is adapted to exhaust air from the drum. Part of this air is discharged through duct 46 into the open, whereas the remainder is blown 75 through a heater 47, a return duct 48, and an entry opening 50 which is likewise provided with louvres 49, back into drum 2, said entry opening 50 being located adjacent the filling opening 9. The vacuum pressure 80 generated by fan 45 inside drum 2 causes a volume of air to be sucked into the drum through opening 31 said air replacing that which is exhausted through duct 46 to the outside. 85

#### WHAT I CLAIM IS:—

1. Apparatus for opening up damp textile materials and for drying them by means of hot air, comprising a rotating perforated drum provided at its ends with a charging 90 and a delivering opening respectively and with means for closing the delivering opening, the drum being tiltable from an axially horizontal into a tilted position and being enclosed within a stationary casing having 95 openings at its ends and means for closing the casing openings, wherein rollers, provided at the filling end of the drum for supporting the drum, are mounted on slides adapted to be vertically raised and lowered, a flap for 100 closing the filling end of the casing and a disc for closing the delivery end of the drum being arranged to be operated in synchronism with the slides, in such manner that flap and disc will be in open position when the drum 105 is in tilted position.

2. Apparatus as claimed in Claim 1, in which friction rollers for supporting and rotating the drum and located at the delivery end of the drum are drivable by a motor. 110

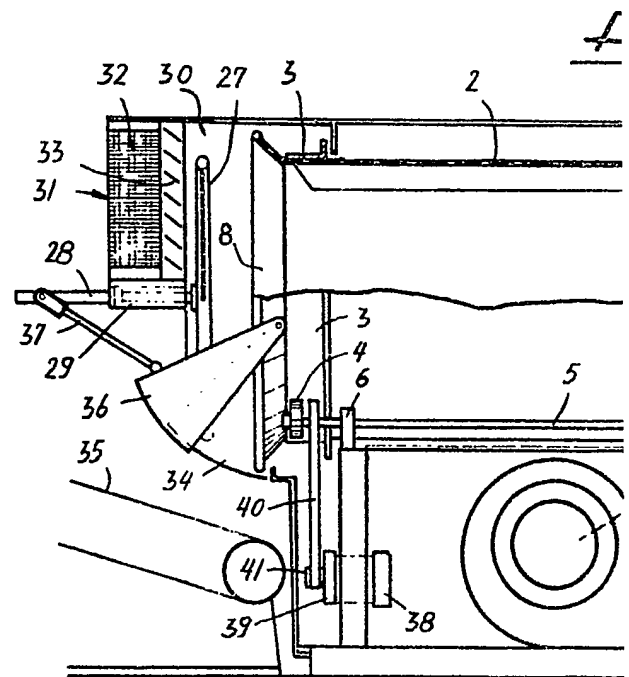
3. Apparatus as claimed in Claim 1 comprising a plurality of, and preferably two, driven shafts extending parallel with the drum axis, each carrying a supporting roller for supporting the drum at the filling and at 115 the delivery end of the drum, said shafts being journaled in hemispherical bearings at both ends of the drum and the bearings nearest the filling end of the drum being adapted to be raised and lowered. 120

4. Apparatus as claimed in Claim 3, in which the hemispherical bearings near the filling end of the drum are each mounted on the upper end of a slide of which the lower end rests on a compression spring which 125 bears on the casing and which is adapted to be adjustably biased.

5. Apparatus as claimed in Claim 4, in which the slide is movable in a vertical direc-

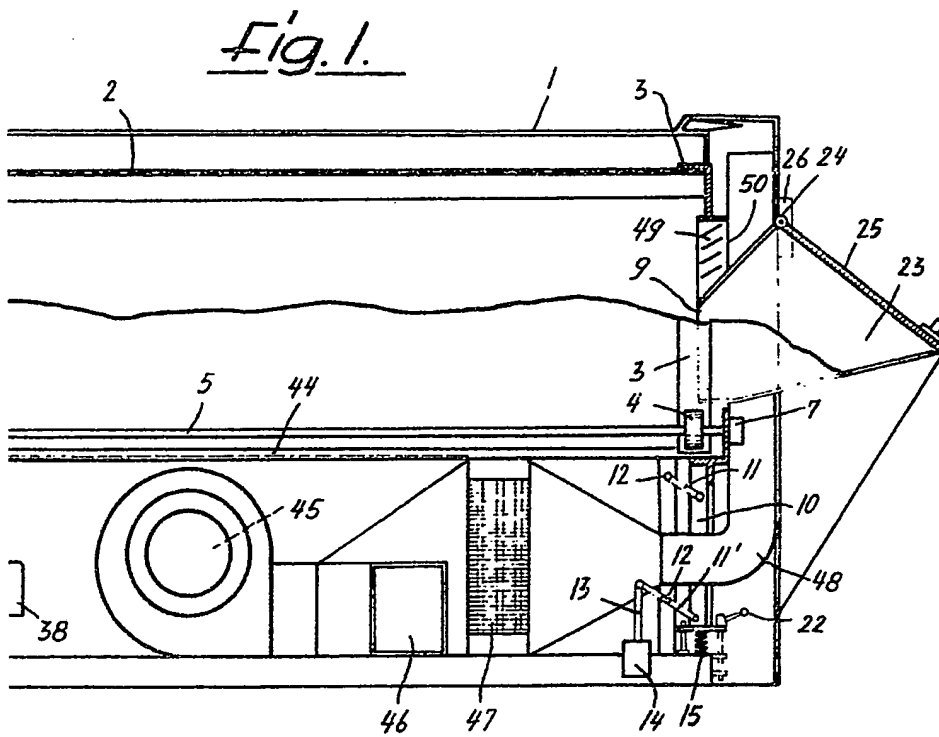
- tion by two parallel levers of which one is deflectable by a pneumatically or hydraulically operable actuator of the cylinder and piston type.
- 5 6. Apparatus as claimed in Claim 5, in which the flap for closing the filling end of the casing is manually operable and coupled with a valve operated by the action of opening and closing the flap, the said valve controlling the cylinder-and-piston type actuators associated with the slides and a further cylinder-and-piston type actuator for operating the disc which opens and closes the delivery end of the drum.
- 10 7. Apparatus as claimed in Claim 6, in which the disc is rotatably mounted on the end of a piston rod extending coaxially with the horizontal drum axis through the associated cylinder-and-piston type actuator.
- 15 8. Apparatus as claimed in Claim 7 in which the disc is perforated and axially displaceable inside a chamber surrounding the delivery end of the drum but separate from the space enclosed between casing and drum, said chamber being adapted for the entry
- thereinto of preheated air and having a chute below the delivery end of the drum for the discharge of the material emerging from the drum, said chute being provided with a flap for opening and closing the same, operable in synchronism with the disc by a link rod coupled with the piston rod of the cylinder-and-piston type actuator which displaces the disc.
- 30 9. Apparatus as claimed in Claim 8 in which hot air heated in heating means is drawn into the chamber surrounding the delivery end of the drum, and thence through the drum, by a fan which discharges part of said air to the outside and returns the remainder into the drum, after the said remainder has been re-heated.
- 40 10. Apparatus for opening and drying damp textile materials substantially as herein described, with reference to the accompanying drawings.
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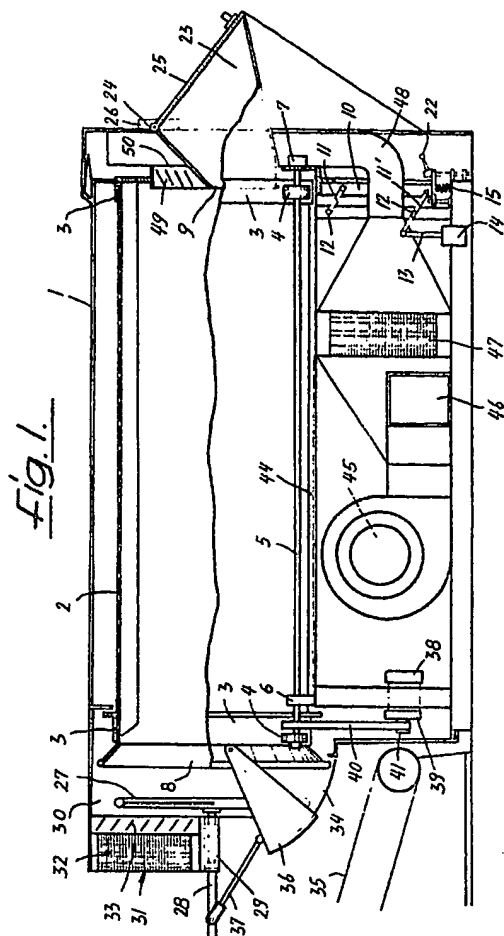
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**2 SHEETS**

This drawing is a reproduction of  
the Original on a reduced scale.  
SHEET 1





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COMPLETE SPECIFICATION

2 SHEETS

This drawing is a reproduction of  
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SHEET 2

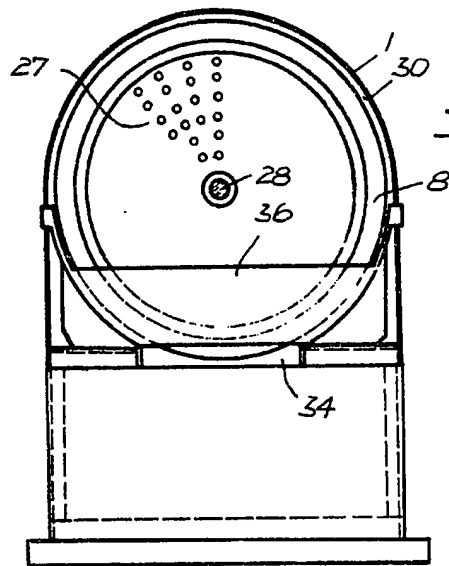


Fig. 2.

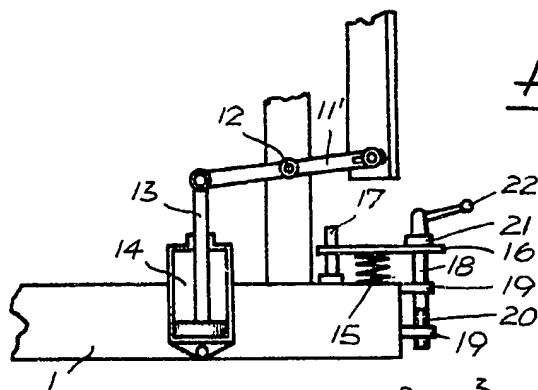


Fig. 3.

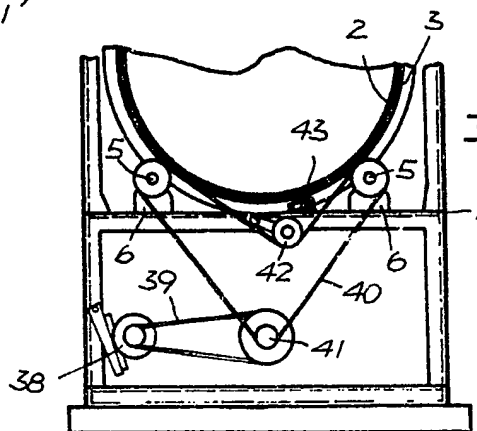


Fig. 4.